TITLE

A METHOD AND A DEVICE FOR PROCESSING AND SEPARATING AN IMBRICATE FORMATION OF FLEXIBLE, FLAT OBJECTS

CLAIM OF PRIORITY

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *A METHOD AND A DEVICE FOR PROCESSING AND SEPARATING AN IMBRICATE FORMATION OF FLEXIBLE, FLAT OBJECTS* filed with the Swiss Federal Institute of Intellectual Property on 12 September 2002 and there duly assigned Serial No. 2002 1554/02.

BACKGROUND OF THE INVENTION

Technical Field

[0002] The invention relates to a method and to a device for processing and separating an imbricate formation of flexible, flat objects, in particular, printed products, according to the preamble of the independent claims.

Prior Art

[0003] From the state of the art there are known various feeders and devices, specifically in order to isolate printed products or to grasp these individually and to transfer these for further transport to a conveyor means. The disadvantages of the state of the art are due to the

counter-running movement pattern, the large inertia and friction forces and abrupt direction change. With the machines used today the operations are not flowing, but have a static component. This means that a printed product to be processed is brought completely to a standstill in order then to be accelerated abruptly in another direction. This has a negative effect, particularly it high processing speeds.

[0004] From CH 324210, there is, for example, known a feeder machine. for the paper industry. This serves for feeding folded printed sheets onto saddles of a feeder transport belt of a binding machine. The device is based on a drum which is arranged between a stack of folded printed sheets supported on an oblique plane and a transport belt with saddles. The printed sheets are arranged standing on the fold in the feed region. The drum which is arranged essentially tangentially to the frontmost printed sheet on its periphery comprises a gripper by way of which the respective frontmost printed sheet of the ply is gripped and pulled off at the cut-edge side. The pulling-off of the next printed sheet is only possible if the previous one has been completely removed from the stack. Each printed sheet is deflected bearing on the drum and thrown off onto a saddle of the feed transport belt. With this device in each case only one printed sheet is processed per operating cycle which results in a limitation of the processing speed due to the basic operating principle. So that the printed sheet may be grasped it is furthermore necessary for the drum of the gripper to carry out a counter-directed movement. With fast-running machines, this leads to high inertia forces. Due to the functioning principle on which it is based, this device is not suitable for processing large volumes and furthermore the separation at the cut-edge side is

burdened with problems.

[0005] DE 2531262 shows a feeder for sheets or folded layers of paper or similarly flexible materials. Printed sheets, in the form of an imbricate flow (leading edge at the top) are moved along an oblique plane by way of a conveyor belt. The printed sheets on a further oblique plane are piled up into an obliquely set position and brought to a standstill. The respective lowermost printed sheet of the oblique ply is grasped by way of a wheel equipped with grippers and deflected by way of a deflection roller. By way of this, the printed sheets are pulled from the obliquely set position. In contrast to the device known from CH 324210, the printed sheets are not pulled off individually but in the form of a continuous, imbricate flow. Due to the large deflection during the pulling-off the printed sheets are greatly loaded. For isolating the printed sheets there is suggested an acceleration path arranged after this.

[0006] EP 1055620 of the same applicant shows a device for accommodating and for the further transport of flat, printed products. A multitude of grippers with associated suction members are attached along a revolving wheel. The printed sheets to be processed are arranged on a stack from which they are lifted by way of the suction members and brought into the active region of the grippers. The printed sheets are gripped by the grippers and subsequently deposited in the form of an imbricate flow and conveyed away by way of a conveyor means. This device permits the gripping of printed sheets in very short distances, wherein the suction heads and products are to be aligned to one another.

[0007] EP 1096914 of the same applicant shows a device for the transport of flat products from a stationary stack positioned in a receiving location to a dispensing location. The device comprises a separating member, as well as a support element and a holding member which are arranged running around a shaft. The products are gripped individually, separated and transferred to a means which serves for the conveying-away. With this device the products are also mechanically loaded.

[0008] WO 00/46135 of the same applicant shows a device for reducing a stack of flat objects, in particular, printer's products. By way of a lifting means, the respective uppermost printed sheet is lifted from a stack and brought into the active region of a conveyor belt which serves for leading away the printed sheets in the form of an imbricate flow. The device is designed such that it is adapted to the height of the stack. Although it is simplified in comparison to the state of the art, one however requires a control.

[0009] EP 0863099 of the same applicant shows a device for isolating stacked printer's products. The printed sheets to be processed are inserted below a stack by way of a. conveying means. From this stack the respective uppermost printed product is gasped by a gripper and led away individually. So that the printed sheets may be gasped they are individually lifted by way of a lifting means and brought into the active region of the gripper.

[0010] EP 0755886 of the same applicant shows a device for feeding folded printer's products

to a location for further processing. Printed sheets supplied in an imbricate flow are led to a stacking location by way of a conveying means, where they are inserted below an intermediate stack. By way of a lifting member moved along a circumferential path (suction member) the respective uppermost printer's product is lifted at the fold edge and brought into the active region of a conveying-away device. The conveying-away device comprises a segmented roller and a circumferential belt which serves for pressing the printed products onto the segmented roller. The printed sheets are lifted one after the other and brought into the active region of the conveying-away device by which they are grasped and led away in the form of an imbricate flow.

[0011] DE 19627830 of the same applicant shows a device for feeding printed products to a conveying-away device. A suction member arranged in the inside of a rotor engages through a recess in order to grasp a printer's product and with a corner region to bring this into the inside of the rotor. The printer's product is then engaged at the bottom by a rotor arm and lifted further in order to bring it into the active region of a conveying-away device. The printed products are conveyed away individually or in the form of an imbricate flow by way of grippers.

[0012] EP 0675061 of the same applicant shows a device for the uninterrupted supply of flat products to a dispensing location. The printer's products are led to a dispensing location by way of an endless conveyor belt. At the dispensing location the conveyor belt, at least in regions, is guided around a deflection roller and engages around the deflection wheel in an undershooting manner. The conveyor belt driven by a stepper motor and a deflection wheel form a conveying gap

for the products to be processed which are arranged in an imbricate formation. The respective uppermost product of a part stack is grasped by way of a suction head and lifted.

[0013] As may be deduced from the above-described documents, the devices known from the state of the art for separating printer's products have a relatively complicated construction, wherein the complexity is partly due to the control. Depending on the mentioned principles the processing speed is furthermore limited so that the printed products are not loaded too greatly or the processing steps are effected in a reliable manner. Most known devices are based on the fact that the printed products for further processing need to be brought completely to a standstill so that they may be grasped by a gripper or equivalent means. Inasmuch as a fluent processing is desired, in the state of the art expensive designs, specifically controls are required in order to be able to separate the printed products with a high accuracy. A further disadvantage of conventional designs for a continuous processing, i.e., if the printed product is not to be brought completely to a standstill lies in the fact that a (limited) buffering with short-term malfunctioning may only be accommodated, in indeed if at all, by complicated sensories with control and regulation installations. For this reason as well as others, most devices envisage a "static" intermediate stack from which the printed products (previously braked to a standstill or almost to a standstill) are accelerated, pulled off and isolated.

SUMMARY OF THE INVENTION

[0014] The object of the invention lies in providing a method and a device for the continuous

processing of an imbricate formation of flexible flat objects, specifically printed products, in particular, for the exact separation and transfer of individual printed products from this imbricate formation to a conveying member, which demand a comparatively low design, control and regulation expense with regard to technology.

[0015] This object is achieved by the invention defined in the independent patent claims.

[0016] The invention is based on a flowing transformation of an imbricate formation of flexible, flat objects, in particular, folded printed sheets, by way of a guide means. In the following one only refers to printed products, wherein other flat objects may of course also be included by the invention.

[0017] The printed products to be processed are preferably supplied in the form of an imbricate flow with which the trailing edges, with folded sheets their fold, of the printed products or printed sheets are arranged at the top and the subsequent printed products overlap. Such an imbricate flow is fed to the guide means which serves for reforming the imbricate flow in angle, alignment and density so that there results a new imbricate formation. Independently of whether the fed printed products are arranged as a stack, a ply or imbricate flow, before separation, they are transferred by suitable means into the mentioned standardized imbricate formation according to the invention With folded printer's products, in contrast to the state of the art, the fold is preferably arranged at the top and the folded sheet is supported on its cut-edge side, so that the folded sheet may be

grasped at the fold individually or in a defined number. The invention thus accordingly permits the processing of a column., a stack or other formations while using the same methods according to the invention for separating the printed products, i.e., that the products need not necessarily be fed as a imbricate flow. Where appropriate thus the standing products e.g., of a column are transferred into the desired obliquely lying position, whereas with an imbricate flow, as described above, an alignment of the: printed products is required Folded sheets if required are previously sorted such that they are directed with their cut-edge side orientated downwards.

[0018] Embodiment forms of the invention shown here may have a modular construction with which several modules may be interactively connected via standardized interfaces. A preferred embodiment form comprises a take-over module, transfer module and a conveyor module arranged after this for removal of printed products. The take-over module serves for bringing the printed products which where appropriate are fed in a different form and arrangement [imbricate] scaling, ply, pile, or stack) into a suitable, standardized initial position which is fed to the transfer module. The transfer module in particular serves for transforming the printed products by way of a guide means according to the invention into an initial position which is optimal for the removal.. By way of the subsequently arranged conveyor module individual or a defined number of separated printed products are removed and conveyed away. With the conveyor module it is for example the case of a revolving tension member or removal drum equipped with grippers.

[0019] In the transfer module the printed products are led actively or passively via a plane,

concavely or convexly curved or angularly bent guide surface of a guide means. Connecting to the end region of the guide surface or the transfer module there is arranged a conveyor means which serves for removal or for separating and leading away the individual printed products. The printed products are led in an imbricate formation with the trailing edge (at the top), onto the guide surface and guided along this. A preferred embodiment form of a guide means comprises a guide surface on whose end there is arranged an essentially perpendicularly projecting edge which serves for the controlled retention and alignment of the elements of the imbricate flow. In contrast to the devices known from the state of the art the device according to the invention permits a dynamic processing of the printed products. At the same time one does away with the basic change of direction which has a negative effect on the processing procedure and the processing speed. The elements are processed in a fluent manner and above all without a disadvantageous loading of the printed products, which means that in alignment and arrangement they are transformed and separated in a gentle and continuous manner. Of course, the invention may also include a passive removal, that is to say the separation and isolation is effected via the transfer module itself and the separated printed sheets or groups of printed sheets are transferred to the removal unit which does not have a separating function.

[0020] Today's known functioning principles demand that the printed products are transferred supported practically in a lying or flat manner. In contrast to this, the printed products with the device according to the invention are aligned by way of the guide means such that in the transfer region of the guide surface, they line up and are separated in an obliquely erect, largely freely

accessible position, In contrast to most solutions known from the state of the art this furthermore has the advantage that the separating procedure does not necessitate a printed product having to be completely separated before the separation of the next printed sheet. At the same time with folded printed sheets, the fold is directed upwards, that is to say away from the guide surface so that the printed sheets individually or in a defined number by way, e. g., of a gripping means may be grasped simply and with great accuracy. The printed products with processing amongst one another and with the guide means display a favorable mutual influencing and stabilization with respect to the method, which is of particular relevance to the procedure in the end region of the guide [metal] sheet.

[0021] Several printing products bearing on one another, due to their specific properties and the arrangement, specifically their flexibility and mutual displacability, in their entirety, display an elastic and flexible behaviour. A first form of elastic behaviour is to be observed with a bundle of printed products which is placed on a plane and is held by abutments and limitations. If the limitations of the printed product bundle in the longitudinal direction are pulled apart, the angle between the printed products and the plane becomes shallower. If the limitations of the bundle however are pushed together, the angle between the plane and the printed products becomes steeper. Understood in this manner, this behavior is elastic. A further form of elastic behaviour in particular is to be observed with an arrangement of folded printed products. On account of the fold, the individual printed products tend to curve up or to open in regions. But also with other flexible products or printed products such flexibility is given on account of material unevenness

and enclosure of air. This has the result that a corresponding stack or a corresponding ply of printed products may be elastically pressed together. A stack of folded newspaper sheets may for exam ple be considerably pressed together. It has been shown that in a guide means according to the invention, given a suitable relative arrangement and alignment of the printed products, to be aligned, this behaviour be used to achieve a compensation and buffer effect. This buffer effect to a certain extent acts as a dynamic intermediate storage (as a result of local compression) and geometric compensation on processing. This effect here is used in a targeted manner in order to compensate differences in the processing speed between device means conveying to and away, or to compensate short-term malfunctioning.

[0022] So that the above-described effects may be exploited, the guide surface used in the guide means preferably has a shape which leads to a compacting of the imbricate formation of printed products guided above it, and simultaneously leads to them being erected (or inclined) in a controlled manner. Guide surfaces which have a plane section which merges into an arc-shaped or straight section running obliquely downwards are particularly suitable.

[0023] In order to separate the printed products, a limitation is present at the end of the guide surface e.g. in the form of a mechanical abutment, which prevents a further leading of the printed products of the compacted imbricate flow along the guide surface. The printed products are dammed and aligned in a controlled manner in the active region of the mechanical abutment. On alignment into a vertical position, due to the shifting of the center of gravity of the printed

products, the laterally acting gravity force continuously reduces so that the printed products come into an unstable equilibrium and then have the tendency to flip over. Roughly at this moment then they come into the active region of the conveyer means, which grips them and leads them away individually. With alternative embodiment forms here there may be included a special separating device which transfers the printed sheets to a subsequent conveyor module.

[0024] In order to support the isolation of the printed products, in certain cases it is useful to provide a means for the active changing of the inclination of the printed products in order to feed the printed products to the conveyor means in a controlled manner at the moment at which they tend to tip over. With this, it may be the case for example of a rotating, plane or structurized roller or a revolving cam belt, by way of which the printed products are influenced by friction, a positive or non-positive fit. According to the field of application, rollers equipped with suction elements or wing compartment wheels which engage between the printed products and thus feed these dynamically to the conveying means are also suitable. A controlled flow of air is likewise suitable which acts on the printed products from the side or from above. A further form of a means supporting this peeling-off or tipping procedure, here called folding-over or separating means comprises a lever on whose one end there is attached a suction cup. The lever is rotatably mounted about a pivot pin, wherein the fulcrum of the pivot pin is arranged on the region of the mechanical abutment at the end of the guide surface. The respective frontmost printed product which prevails at the mechanical abutment (brim) is pressed against the lever or suction cup. In order to transfer this first printed product then to the conveyor means, the lever and with it the printed product held

by the suction cup is tilted in a relatively rapid manner so that the product is tilted relatively quickly so that the printed product stands freely and may be grasped by the conveyor means. The remaining printed products remain standing a result of their inertia or held by mechanical abutments. It is possible without further ado to also effect the removal or the conveying-away by way of revolving roller pairs, conveyor belts or alternative conveyor means.

[0025] The distance between the guide surface and the conveyor means, or the folding-over means is preferably adjustable so that the device is suitable for processing printed products of a variable format. A further advantage of the invention lies in the fact that at the location of the separation and when required one may provide a points [switch] system so that the printed sheets directly after the transfer module may be transferred to various conveyors or may be removed by these.

[0026] The device, particularly on the guide surface may comprise additional active means which serve the control of the flow, the density and the shape of the imbricate flow. With these guide means it is the case, for example, of one or more revolving guiding belts (conveyor belts) which by way of friction act on the flow behaviour and folding-over of the printed products. The guide means are arranged along the whole guide surface or only in sections. According to requirement they have the same or different conveying speeds and are directed equally or counter to one another. The, oblique position of the printed products is suitable in order to obtain a buffer and compensation effect, which, for example, serves for compensating fluctuations in the

processing speed.

[0027] In particular in the region of the guide surface or of the guide means one may provide stabilizing means which on starting the device or in the case of a disturbance stop or "freeze" the dynamic process. With these means it is the case preferably of a gripper, lever or flaps which when required engage into the flow of printed products to be processed and support and stabilize these in angle and alignment. These stabilizing means may be arranged movable so that at least for a certain stretch they may be co-moved with the flow of the printed products. Telescopically extendable flaps or rods are particularly suitable for starting and stopping the processing procedure. The stabilizing means may form a part of the device or be arranged separately.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

[0029] Fig. 1 illustrates a first embodiment form of a transfer device with a convex guide surface;

[0030] Fig. 2 illustrates a second embodiment form of a transfer device with conveyor belts;

[0031] Fig. 3 illustrates the embodiment form according to Figure 2 in a lateral view;

[0032] Fig. 4 illustrates a third embodiment form of a transfer device with essentially straight sections;

[0033] Fig. 5 illustrates a fourth embodiment form of a transfer device with a convex guide surface; and

[0034] Fig. 6 illustrates a further embodiment form with a transverse displacement of the printed sheets directly before removal.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0035] Figure 1 shows a first embodiment form of a guide means 1 according to the invention in a lateral view. On a convexly curved guide surface 2 printed products 10 in an imbricate formation 13 are led in the arrow direction P towards an edge (brim) 3 which is arranged at the end of the guide surface 2 and which serves as a mechanical abutment for the printed products 10. The printed products 10 lie with their cut-edge side 12 on the guide surface 2, wherein the fold 11 of the printed products 10 points upwards. Printed products which are distanced far from the brim 3 are located in an imbricate arrangement with which the fold 11 runs subsequent to the cut-edge side 12. Printed products 10 which are located nearer the brim 3 in contrast are steeper, that is, they are set standing obliquely. In contrast to the devices known from the state of the art the transformation is effected in a fluent manner and is primarily effected by the interaction of the printed products amongst one another and in particular by the geometry of the guide means. With this the printed products 10 are fed to the guide means by way of a variously designable product feed 14 according to the state of the art shown only schematically here, e.g., a conveyor bell.

[0036] The printed products 10 are moved forward in the context of the imbricate formation 13 along the guide surface 2 as a result of the force effect of the subsequent products and the inclination. Alternatively or supplementary to this, one uses active means (not shown in more detail in this figure), in particular additional conveyor belts. The guide surface 2 and the brim 3 influence the shape of the imbricate flow and the alignment of the printed products 10 in a targeted manner and in a manner such that the printed products 10 at the end of the guide surface 2 in the region of the brim 3 assume an optimal alignment for gripping, here by way of gripper 8 fastened oil revolving tension element 9, The brim 3 dams the flow of the imbricate formation 13, by which means the printed products 10 run onto one another in a controlled manner and are aligned as a result of the specific shape of the guide surface 2. The curvature and in particular the inclination of the guide surface 2 are designed such that one achieves a controlled erecting of the printed products 10. A further advantage of the curved guide sheet [metal] lies in the fact that the fold edges of the printed sheets, where appropriate with guide means engaging on the fold side, may be made almost straight. This in particular simplifies the arrangement and design of the means 5 for separating the printed sheets. According to the invention, the guide surface 2 accordingly at least in regions is inclined with respect to the horizontal so that the printed products in the conveying direction are subjected to a certain wedge effect and thus "compression" of the product flow. This inclination of the guide surface 2 with preferred embodiment forms is at least partly more than 30° with respect to the horizontal so that the desired aligning procedure of the printed products is effected. In the direct vicinity of the brim 3, the printed products are located with the fold upward (z-direction) in an essentially perpendicular position from which individually or in

a defined number they are transferred to the conveyor means, here the grippers, for leading away.

[0037] Above the edge 3 one may recognize folding-over means 5 which serves for the controlled folding-over of the printed products 10. With the folding-over means 5, it is the case here of a winged wheel 6 rotating about an axis A (perpendicular to the plane of the drawing) with arms 7. The arms 7, as a result of the rotation of the winged wheel 6 engage between the printed products 10 located at the end of the guide surface and have the effect that these are released or peeled away in a controlled manner and are separated or isolated from one another in the region of the fold. The printed products 10 separated from one another in the region of the fold 11 individually or in a defined number are brought into the active region of grippers 8, are gripped by one of these grippers 8 and subsequently conveyed away. It may be easily recognized in Figure 1 that the folding-over means effects or supports a peeling away and subsequent "tipping-over" of the respective printed product. According to the invention, the printed sheets on removal by way of the folding-over means 5 are actively transferred into an obliquely standing position in the conveyor direction. Although the procedure described here effects an optimal removal, with other embodiment forms by way of the folding-over means 5 there may be effected a mere lifting for removal, so that the term "folding-over means" is not to be understood in a limiting manner and this may also be described as a separating means.

[0038] The distance D between the guide surface 2 and the folding-over means 5 or the gripper 8 may be adjusted so that one may process differently large elements. At the same time, the guide

surface may be inclined differently or displaced, or alternatively, the folding-over means 5 and the removal means 8, 9 may also be arranged movable. With special embodiment forms, the adaptation to various formats may also be envisaged by sensories with a suitable control and regulation which accordingly automatically adjust the control elements (position and acting forces of the folding-over means, removal means etc.).

[0039] Figure 2 shows a second embodiment form of a transfer device with a guide means 1, in a lateral section. Conveyor belts 15 are arranged along the guide surface parallel to the flow direction B of an imbricate formation (not shown here), and serve as guiding elements, for the targeted acceleration or braking, in sections, of the printed products located on the guide surface 2. The alignment and the flow behaviour of die printed products are influenced in a targeted manner by way of this. According to the field of application the conveyor belts 15 are supported by air (e.g. fanning-open by pressure or retention by vacuum). The conveyor belts 15, when required, may furthermore be driven in the same or in opposite directions.

[0040] The guide means 1, where appropriate, may be a changeable geometry, which at least in regions permits a targeted setting of the curvature of the guide surface 2. Guide means 1 may thus be adjusted to different printed products. By way of changing the curvature, one influences the inclination, but also friction forces and thus the flow and damming behavior. A preferred embodiment form comprises a guide means manufactured of sheet metal, which is (elastically) deformed by a bending device, e.g., by way of an adjusting screw or hydraulics.

[0041] Figure 3 by way of arrows 16.1, 16.2, 16.3 schematically shows the influence of three conveyor belts 15.1, 15.2, 15.3 on the printed products 10 of the imbricate formation 13. The length of the arrows 16.1, 16.2, 16.3 by way of example illustrate the speed of the conveyor belts 15. As the arrows 16.1, 16.2 illustrate the conveyor belts 15.1, 15.2, 15.3 here are driven in the flow direction of the imbricate formation 13, wherein the second conveyor belt 15.2 has a higher speed 16.2 than the two other conveyor belts 15.1 and 15.3. By way of this, it is achieved that the printed products 10 in this region are accelerated at the cut-edge side in the direction of the brim 3. After the printed products 10 have left the active region of the second conveyor belt 15.2, they get into the active region of the third conveyor belt 15.3 where the printed product are braked at the cut-edge side. By way of this procedure, it is achieved that the printed products 10 are erected in a controlled manner. Other embodiment forms and drive concepts are also possible according to requirement. The conveyor belts 15 may be driven differently or regulated or controlled and different friction forces with respect to the conveyor belts 15 or guide sheet [metal] 2 may additionally influence the product flow.

[0042] The conveyor belts 15.1, 15.2, and 15.3 furthermore serve the control of the arrangement of the printed products, in particular on starting and stopping the device and in the case of malfunctioning. Erecting or pivotable flaps and grippers, here indicated by a flap 22 pivotable about an axis 23, in a supplementary manner or alternatively serve as a control and stabilizing means for the position and alignment of the printed products. When required, these means may be designed movable, and led subsequently to the product flow.

[0043] These conveyor bolts 15.1 to 15.3 support the procedure already described by way of Figure 1, with which the printed products 10 on supply to the guide surface 2 of the guide means 1 are conveyed lying in an overlapping manner, wherein the trailing edge of a printed product in each case lies over the leading edge of the subsequent printed product. During the transport over the guide surface 2, the printed sheets 10 are continuously erected so that on removal from the guide means 1 they have an obliquely standing position, with which the printed products are inclined slightly opposite to the conveying direction,

[0044] Figure 4 shows a third embodiment form of a guide surface 2. This is composed of three essentially straight sections 17.1, 17.2, 17.3. Due to the greater inclination of the second section, it is effected that the printed products 10 increasingly dam in the third section 17.3 and here are erected in a controlled manner. Due to the length of the guide surface or its inclination and surface nature the compacting of the imbricate formation 13 in the transfer region of the brim 3 is set. The shape of the guide surface 2 is to be determined depending on the nature of the printed products to be processed. On the guide surface 2 there are present additional guide elements 18 which stabilize and lead the flow of tile printed products 10 in the lateral direction. With the guide element 18, it is the case preferably of projecting guide sheet [metal] which is arranged essentially parallel to the flow direction of the imbricate flow. These guide elements 18 are preferably arranged in an adjustable manner so that they may be set to the width of the printed products 10. The guide elements 18 serve for stabilization of the dynamic flow of the imbricate formation 13. In order to achieve an additional stabilization on standstill of the formation 13, i.e., if the printed

products 10 are not in motion, the guide means 18 may be moved toward one another so that the printed products 10 are clamped therebetween and thus are stabilized. Additional elements, e.g., in the form of laterally engaging pins are conceivable.

[0045] A further embodiment form with guide means 18 uses laterally arranged conveyor means. With this, it is preferably the case of conveyor belts, conveyor rollers, vacuum belts or brush conveyors. The guide means 18 this time are not arranged in the proximity of the guide surface as shown in the example, but may be arranged also at a constant or variable height next to the guide surface 2.

[0046] Figure 5 shows an essentially concavely shaped guide surface. 2. The compacting of the printed products located in the region of the brim 3 here differs from the other shown embodiment forms. It may be recognized that due to the geometry of the guide surface 2 and the relatively few supplied printed products, the imbricate formation has a comparatively loose arrangement. The edge 3 is inclined away in the direction of the product flow, so that the frontmost printed sheet has an inclination which is directed to the right, and forms a support for the subsequent printed sheet.

[0047] As is to be recognized, the printed products 10 are not subjected to abrupt changes in direction, but rather, are constantly and continuously brought into a position which is optimal for isolation and gripping. Byway of an arrangement with which the fold is arranged upward, the printed products may be simply gripped. The guide surfaces are preferably formed by the surfaces

of a suitably formed sheet [metal]. The concept based on the flow behaviour and the specific properties of an imbricate flow permits a simple and robust construction. Since one practically requires no quickly moved parts and the printed products are not subjected to an abrupt direction change or mechanical loading, devices according to the invention permit comparatively higher processing speeds. An additional advantage of the invention is manifested in that in particular with folded sheets in the region of the cut-edge side, there arises a greater compression than in the middle or on the fold edge of the folded sheet. The folded sheets have the tendency to extend in the middle region so that the fold edges do not bear tightly on one another, but may be processed in a slightly fanned-open formation, which in particular simplifies the separation or the already described folding-over.

[0048] The above described embodiment examples have a brim 3 which is directly connected to the guide means. The required abutment however, according to the invention, may also be formed by way of a separate means, for example, a movable sheet [metal] or abutment rods. In this case it is possible to design the abutment in an adjustable manner so that with different product properties (size, flexibility, thickness, etc.) one provides an adjusting possibility, In Figure 5 there is indicated a movable abutment which on removal of a printed sheet is moved in the direction of the arrow M so that the frontmost printed product may also be released on the cut-edge side and thus may be easily removed. The removal means in the embodiment example according to Figure 5 comprises a conveyor with which the printed products directly after separation (here not shown in detail) and the removal are conveyed away essentially vertically upward in the direction of

arrow H.

[0049] With particular embodiment forms the brim 3 or the abutment may also be formed by movable elements which convey the printed products in the removal direction so that the removal procedure may be supported in such a manner. With this, a person skilled in the art would provide rollers revolving about a horizontal axis, where appropriate controllable, which minimize and avoid any frinction forces of the products to be removed with respect to the brim 3. With particular embodiment forms, with the separation, one may also directly effect a transfer to various removal means, e,g., to various grippers in an alternating manner.

[0050] In Figure 6 there is shown an alternative embodiment example of the invention. Here the printed products, directly before the separation and removal, are slightly displaced in the direction of arrow S with respect to their main conveying direction P essentially at right angles on the guide surface 2. This transverse shifting may be effected by a simple lift means, for example, a sheet [metal] plating which engages at the side edges of the printed products. Furthermore, the subsequent printed products may be held back in a simple manner by way of a retaining means 29 on the fold side. After separation, the printed products are conveyed away by way of the removal means 9 in the manner described above.